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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/511,290

Filing Date: October 14, 2004

Appellant(s): LEIMALA, RAIMO

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Bruce D. Gray  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 10/4/2010 appealing from the Office action mailed 6/9/2010.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The following is a list of claims that are rejected and pending in the application:

Claims 1-3 and 5-23 (refer to the previous advisory action marked 11/3/2009)

**(4) Status of Amendments After Final**

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

**(5) Summary of Claimed Subject Matter**

The examiner has no comment on the summary of claimed subject matter contained in the brief.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

### **(7) Claims Appendix**

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

### **(8) Evidence Relied Upon**

6,007,600	Hyvarinen et al	10-2004
US Re 36,118	Cupertino et al	10-2004
6,165,367	Partridge	2-2006

### **(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

#### ***Claim Rejections - 35 USC § 103***

Claims 1, 5, 8-12, and 15 are rejected under 35 U.S.C. 103(a) as being obvious over Hyvarinen et al (US 6,007,600, thereafter US'600) in view of Cupertino et al (US Re 36,118, thereafter US'118).

Regarding claim 1, US'600 teaches a method for producing copper in a hydrometallurgical process from copper-bearing raw material. The copper-bearing solution obtained from the leaching is subjected to reducing and solution purification (Abstract of US'600). US'600 teaches monovalent copper in a chloride-base solution (Col.2, lines 44-67 of US'600), which reads on the removal of one or more metal impurities in chloride-base copper

recovery process comprising monovalent copper as recited in the instant claim. US'600 teaches that impurities of the CuCl-NaCl solution are removed by using known reagents (Col.3, lines 59-63 of US'600). US'600 does not specify apply chelating ion-exchange resin to remove one or more metal impurities. US'118 teaches a method for separating a metal selected from the group of magnesium, copper, titanium, iron, zinc from an organic complex thereof (Col.1, lines 8-10 of US'118). US'118 teaches applying a chelating ring resin to extract the metal from the aqueous solution in the form of a complex of the metal and the extractant (Col.1, lines 11-19, examples 5-6 of US'118, and claims 1-10), which reads on the method of removal impurities by contact an aqueous with a chelating ion-exchange resin and removing the metal impurities from said solution using said chelating ion-exchange resin. US'118 teaches that the compound of organic phase are valuable for the selective extraction of antimony and /or bismuth contaminants from the highly acidic solutions used in copper refining (Col.3, lines 19-27 of US'118), which reads on the limitation of the chelating ion-exchange resin binding one or more metal impurities and not binding copper in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply chelating ion-exchange resin to

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remove metal impurities as demonstrated by US'118 in the process of US'600 because US'118 teaches the method is particularly effective for the recovery of metals include chromium, manganese, cobalt and copper (Col.4, lines 60-66 of US'118).

Regarding the limitation of the solution having an acidic or neutral pH of at least 6 and alkali chloride content of at least 200g/l in the instant claim 1, US'118 teaches the metal is obtained in weakly acid aqueous solution so that it can be precipitated, for example as the hydroxide or oxide, by neutralization of the small amount of acid with a small amount of alkali (Col.2, lines 1-7 of US'118) and US'118 teaches a method comprises treating the complex with a weakly acid aqueous solution of an alkali metal or alkaline earth metal chloride having a chloride content of at least 4 molar (Claim 1 of US'118, 4 molar NaCl is about 232g/l—noted by examiner).

Regarding claim 5, US'118 teaches the method including metal complexed with an organic complexing agent capable of being stripped with an aqueous acid, which includes zinc, lead, iron, or manganese (Col.4, line 60 to Col.5, line 4 of US'118), which is the same metals as recited in the instant claim.

Regarding claim 8, US'118 teaches the aqueous solution with pH value of 2.0, which reads on the acidic environment as claimed in the instant claim.

Regarding claim 9, US'118 teaches the metal is obtained in weakly acid aqueous solution so that it can be precipitated, for example as the hydroxide or oxide, by neutralization of the small amount of acid with a small amount of alkali (Col.2, lines 1-7 of US'118), which reads on the neutral environment as recited in the instant claim.

Regarding claims 10 and 11, US'600 teaches: "...a countercurrent leaching of a sulfidic copper material, such as chalcopyritic copper concentrate, in a chloride milieu, so that the obtained product is essentially iron-free alkali chloride-copper chloride solution, where the copper is mainly monovalent..." (Col.2, Line 44-67 and also refer to Fig.1-3). US'600 shows "...the leaching is performed into a circulating NaCl solution..." (Col.3, Line 35-46 and refer to Fig.1-3). US'600 also teaches: "The precipitation is carried out by means of sodium hydroxide..." (Col.4, Line 3-19, refer to Fig. 1-3 step 13). US'600 teaches the similar hydrometallurgical process by applying the same copper-contained solution as recited in the instant invention.

Regarding claim 12, US'118 further teaches different metals (Fe, Ni, Zn, Cu) reacted with different strip solutions (A= 0.5 molar HCl; B= 0.5 Molar HCl +2.75 molar CaCl<sub>2</sub>) in example 4 (Col.7, Line 6-43 of US'118). The concentration levels of Fe, Ni and Zn in the aqueous phase after reacted with strip solution are less than 500 ppm (1ppm = 1 mg/L for H<sub>2</sub>O— noted by examiner). This concentration range overlaps the limitation as recited in the instant claim.

Regarding claim 15, it includes the limitations of claim 1 and limitation of a monovalent copper content of 30-100g/l, US'600 in view of US'118 teaches the limitation of claim 1 (refer to the rejection for the instant claim 1). US'600 does not specify the amount of monovalent copper content of 30-100g/l as recited in the instant claim, US'118 teaches an acid strength of up to 0.5 molar above the stoichiometric requirement for stripping the metal whereby said complex is decomposed and metal ions are transferred to the aqueous solution (Claim 1 of US'118, 0.5 molar copper is about 32g/l—noted by examiner, also refer to the example 4 of US'118), which is within the claimed copper content range as recited in the instant claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a proper amount of

copper as demonstrated by US'118 in the process of US'600 because US'118 teaches the method is particularly effective for the recovery of metals including chromium, manganese, cobalt and copper (Col.4, lines 60-66 of US'118).

Claims 2-4 and 13 are rejected under 35 U.S.C. 103(a) as being obvious over US'600 in view of US'118, and further in view of Partridge (US 6,165,367, thereafter US'367).

Regarding claims 2-4, US'118 teaches that it is known in the art that the organic complex is produced from an aqueous solution of metal salt with a chelating resin. This point is further evidenced by US'367. US'367 teaches a method for selectively removing a heavy metal from an aqueous waste streams and more particularly to methods for reducing the heavy metal content in the waste steam to sub-pmm level (Col.1, Line 5-9 of US'367). US'367 teaches: "...providing a chelating resin containing amino-phosphonic group for capturing the heavy metal ions...."; "...wherein the chelating resin is a styrene divinylbenzene copolymer..." (Claims 1-4 of US'367); US'367 teaches the resin' group can be "represented as: -NH-CH<sub>2</sub>-PO<sub>3</sub>Na<sub>2</sub>" (Col.2, Line 22-37); and US'367 also tests "...a chelating resin with iminodiacetic acid functional group..." (Col.4, Line 38-41).

Compared with the instant invention, US'367 overlaps the limitations related to chelating ion-exchange resin recited in the instant claims 2-4. The similar hydrometallurgical process to extract heavy impurities with the similar ion exchange resin taught by US'367 renders *prima facie* obvious. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a suitable ion-exchange resin as demonstrated in US'367 in the process of US'600 in view of US'118.

Regarding claim 13, US'600 teaches that the reduced granular or pulverous copper product is further subjected to melting and casting in order to produce commercial-grade copper (Col.1, lines 17-20 of US'600). US'367 teaches "methods for selectively removing a heavy metal from an aqueous waste streams and more particularly to methods for reducing the heavy metal content in the waste steam to sub-ppm level." (Col.1, Line 5-9, this metal impurity level is compatible with the level recited in the instant invention—refer to the instant claim 12). This means that it would have been obvious to one of ordinary skill in the art to get "cathode copper LME-A grade copper" as demonstrated in US'367 in the process of US'600 in view of US'118.

### **(10) Response to Argument**

The appellant's arguments filed on 10/04/2010 have been fully considered but they are not persuasive.

In the remarks, appellant argues:

1) Claims 1, 5, 8-12, and 15 are patentable over Hyvarinen et al (US'600) and Cupertino et al (US'118). Regarding claims 1, 5, 8, and 9, the Office fails to explain what these metal impurities are; the Office fails to explain how it knows that these unidentified impurities are of a type that is suitable for removal by the ion exchange resin of US'118; the Office has not explained why, if the impurities have already been removed by precipitation with granular copper and/or sodium hydroxide, it would have been necessary or even desirable to treat the resulting stream with the chelating ion-exchange resin of US'118; the Office has not even identified any particular impurity that would remain after the treatment specified in US'600; the Office does not explain where, in either of the references, it is taught or suggested that the use of organic complexes of US'118 is a suitable replacement for, or addition to, the precipitation techniques already disclosed as suitable by US'600; the Office has yet to explain why one having ordinary skill in this art would have, in particular, selected the ion exchange resin embodiment of US'118 for use with the (unspecified) metal contaminants of US'600. Regarding claim 10, sodium chloride is used to displace an alkaline regeneration solution because otherwise stability of the monovalent copper solution can become problematic. Neither of cited references address this problem. Regarding claims 11 and 12, there is no disclosure of any monovalent copper in US'118 to be separated from metal impurities

present in the solution. Even if there were such a disclosure, there is no suggestion in either reference to precipitate out any of the metal impurities before treatment with an ion exchange resin. Regarding claim 15, Example 4 of US'118 does not support the Office's assertions because organic extraction solution is not ion exchange resin.

2) Claims 2-4 and 13 are patentable over Hyvarinen et al (US'600), Cupertino et al (US'118), and Partridge (US'367). Appellant's claims are directed to removing metal impurities from an aqueous strong chloride solution of monovalent copper using a chelating ion exchange resin, while leaving the monovalent copper in the aqueous chloride solution. This is not disclosed or suggested in Hyvarinen et al (US'600) or Cupertino et al (US'118). Partridge (US'367) does not cure the deficiencies of Cupertino et al (US'118). Even if were proper combine Partridge (US'367) with Hyvarinen et al (US'600) and Cupertino et al (US'118), the result would not be Appellant's claimed method, but rather a method where all heavy metals are removed (including any monovalent copper).

In response :

Regarding the argument 1), the Examiner disagrees with the appellant's argument because as pointed out in the rejections for the instant claims. US'600 teaches that impurities of the CuCl-NaCl solution are removed by using known reagents (Col.3, lines 59-63 of US'600). The whole paragraph for this teaching is: "Thereafter the solution 9 obtained from reduction, in which solution all copper now is present as monovalent, is conducted to solution purification 10, where impurities of the CuCl--NaCl solution are removed by using known reagents 11, and also by means of products

obtained from the later stages of the process, i.e. granular copper 8 and sodium hydroxide 13 formed in the chlorine-alkali electrolysis 12. In the solution purification, metallic impurities are precipitated from the copper (I) chloride solution as precipitates 14 at pH values which are lower than the pH values of a solution corresponding to the precipitation of Cu<sub>2</sub>O. (Col.3, line 59-col.4, line 2 of US'600). In here, US'600 clearly teaches metallic impurities are precipitated from the copper (I) chloride solution as precipitates. The Appellant argued that no disclosure of any monovalent copper in US'118 to be precipitated out, the Appellant 's argument is against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, US'600 in view of JP'118 is applied to claims 1, 5, 8-12, and 15; and US'600 in view of US'118, and further in view of US'367 is applied to claims 2-4 and 13. US'118 teaches the method is particularly effective for the recovery of metals include chromium, manganese, cobalt and copper (Col.4, lines 60-66 of US'118) and US'367 teaches a method for selectively removing a heavy metal from an aqueous waste streams and more particularly to methods for reducing the heavy metal content in the waste steam to sub-ppm level (Col.1, Line 5-9 of US'367), which provide good motivations to combine US'118 and US'367 to US'600. The Examiner notes that US'600 clearly teaches having monovalent copper before solution purification process (Fig.1-3 and Col.2, lines 44-58 of US'600). Still regarding the argument 1), using the proper reagents to remove the impurities obvious to one of ordinary skilled in

the art, which is evidenced by US'600. US'600 teaches "...impurities of the CuCl--NaCl solution are removed by using known reagents 11..." (Col.3, line 59-col.4, line 2 of US'600). The known reagents include ion exchange resin because US'118 not only teaches applying a chelating ring resin to extract the metal from the aqueous solution in the form of a complex of the metal and the extractant (Col.1, lines 11-19, examples 5-6 of US'118, and claims 1-10), but also teaches the method is particularly effective for the recovery of metals include chromium, manganese, cobalt and copper (Col.4, lines 60-66 of US'118). US'118 also teaches an acid strength of up to 0.5 molar above the stoichiometric requirement for stripping the metal the metal whereby said complex is decomposed and metal ions are transferred to the aqueous solution (Claim 1 of US'118, 0.5 molar copper is about 32g/l—noted by examiner), which is within the 30-100g/l monovalent copper content range as recited in the instant claim 15. The example applying chelating resin may refer to the example 5 of US'118.

Regarding the argument 2), US'367 is applied to claims 2-4 and 13 for evidencing that the organic complex is produced from an aqueous solution of metal salt with a chelating resin. US'367 clearly teaches a chelating resin containing aminophosphonic function groups are found selectively remove the heavy metals including uranium, zinc, nickel, cobalt, beryllium, lead, tungsten, vanadium, and molybdenum (Col.2, lines 3-21 of US'367). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a chelating resin to remove above heavy metals in the process of US'600 in view of US'118. Furthermore, using a chelating resin for selective removal of impurities from copper

solution is known in the art as taught in US'118 (Col.4, lines 29-36 of US'118). Therefore, there is no reason to expect the copper would be reduced to sub-ppm level by the chelating resin. US'367 teaches "methods for selectively removing a heavy metal from an aqueous waste streams and more particularly to methods for reducing the heavy metal content in the waste steam to sub-ppm level." (Col.1, Line 5-9 of US'367), which meets requirement of the limitation of removing one or more metal impurities as recited in the instant claim 13. The Appellant has not provided any evidence to support the argument that US'367 may remove all heavy metals (including any monovalent copper). Because that chelating resin is applied for selective removal of impurities from copper solution is known in the art as taught in US'118 (Col.4, lines 29-36 of US'118), it is heavy metal impurities not copper which would be expected to be removed in the process of US'600 in view of US'118 and US'367.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Jie Yang/

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